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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/859,513	05/18/2001	Keizo Hosoda	208578US0	4271

22850 7590 09/15/2003

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1940 DUKE STREET
ALEXANDRIA, VA 22314

EXAMINER

BEREZNY, NEAL

ART UNIT	PAPER NUMBER
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2823

DATE MAILED: 09/15/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/859,513

Applicant(s)

HOSODA ET AL.

Examiner

Neal Berezny

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 May 2003.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 5, 9 and 12-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 5, 9 and 12-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 May 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☒ Interview Summary (PTO-413) Paper No(s). 8.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
2. Claims 5, 17, and 18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 5 recites the limitation "the tantalum oxide film treated with the active oxygen species" in line 5. There is insufficient antecedent basis for this limitation in the claim. The tantalum oxide film is treated later in the process.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.
4. Claims 1, 5, 15-18, and 20-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Narwankar et al. (6,475,854). Narwankar teaches a method of manufacturing a capacitor having a tantalum oxide film as an insulating film, col.12, ln.30, said method comprising: a vapor-phase depositing a tantalum oxide film on a lower electrode, such as Ru and Pt; col.12, ln.36 and 15, treating the tantalum oxide film at a temperature of 300 to 650°C in an

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atmosphere of active oxygen species; col.12, ln.38-51, annealing the tantalum oxide film, at a temperature of 620 to 690°C, which temperature is lower than a crystallization temperature of tantalum oxide, in an inert atmosphere; col.12, ln.38-48, and forming an upper electrically conductive film on the annealed tantalum oxide film, col.12, ln.66, and wherein the active oxygen species are generated by irradiating an ozone with UV, by a remote oxygen plasma, or by a remote N₂O plasma method; col.12, ln.49-52.

5. Narwankar does not appear to specifically state that the treatment and anneal steps are both conducted in the same process, nor is an ordering of the steps specified. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Narwankar in order to use both dielectric treatment steps taught by Narwankar together to both oxygen stuff and anneal the tantalum oxide dielectric, thus reducing oxygen vacancies and defect densities of the dielectric layer of the capacitor, thus increasing capacitance and lowering the leakage current. Further, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Narwankar to perform both steps, treating and annealing, separately, since it has been found that constructing a formerly integral process into various process

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steps involves only routine skill in the art. *Nerwin v. Erlichman*, 168 USPQ 177, 179.

6. Claims 9, 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Narwankar et al. (6,475,854) as applied to claims 1, 5, 15-18, and 20-24 above, and further in view of Doklan et al. (4,851,370). Narwankar does not specifically teach the formation and treatments and anneals of multiple layers of TaO layers. Doklan teaches forming low defect density oxides for capacitors containing multiple layers of oxide, see abstract and fig.1. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine Doklan with Narwankar to form a capacitor dielectric containing multiple layers of TaO, thus performing multiple sets of deposition, treatment, and annealing steps, in order to form separate and distinct layers, each layer having its own distinct defect pattern, which when overlapped would result in most of the defects being misaligned, thus forming a structure with fewer defect that completely traverse the dielectric, thus reducing leakage currents and device failures, see Doklan, col.2, ln.46-62.

Response to Arguments

7. Applicant's arguments with respect to claims 1, 5, 9, and 12-14 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP


§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Neal Berezny whose telephone number is (703) 305-1481. The examiner can normally be reached on M-F 9:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on (703) 306-2794. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.


Olik Chaudhuri
Supervisory Patent Examiner
Technology Center 2800

NB
September 5, 2003